

~~signature of pathogens (R.G. Pinnick, et al., “Real-time measurement of fluorescence spectra from single airborne biological particles”, *Field Anal. Chem. Technol.* 3, 221 (1999); Scully et al., “FAST CARS: Engineering a laser spectroscopic technique for a rapid identification of bacterial spores”. PNAS, 99, 10994, (2002)).~~

The invention provides a novel methodology that overcomes limitations of the conventional fluorescence sensing. To increase the fluorescence intensity, we will employ the effect of enhanced fluorophore absorption/emission rates by ~~surface plasmon resonance (SPR) of nearby metal (silver, gold) nanoparticles (M. Kerker, “Optics of colloid silver”, *J. Colloid Interface Sci.* 105, 298 (1985); Lakowicz et al, “Intrinsic fluorescence from DNA can be enhanced by metallic particles”, *Biochem. Biophys. Res. Comm.* 286, 875 (2001); Gryczynski et al., “Multiphoton excitation of fluorescence near metallic particles: enhanced and localized excitation”, *J. Phys. Chem. B*, 106, 2191 (2002)).~~ When the fluorophore is in a direct contact with a metal nanoparticle, fluorescence is completely quenched by energy transfer to metal. However, at the distance of 10 nm—100s nm between the fluorophore and metal nanoparticle the absorption and emission rates can be, respectively, enhanced by factors of 10^2 and 10^3 [11]. The enhancement of the emission intensity depends on fluorescence quantum yield Q , where $0 \leq Q \leq 1$.

The invention provides a novel sensor and a novel methodology that overcomes limitations of the conventional fluorescence sensing. ~~It is the first~~ The invention that implements a measurement of plasmon enhanced multi-band fluorescence for analyte identification in fluorescence sensing.

Current fluorescence sensors sensing are is based on a measurement of a single-band fluorescence,